PATENT ABSTRACTS OF JAPAN

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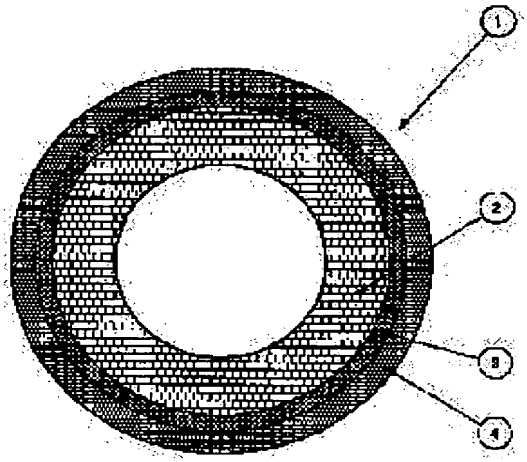
KAWASAKI HIROSHI

(54) FIXING ROLLER

(57)Abstract:
PROBLEM TO BE SOLVED: To improve the adhesion of a core bar to an elastic layer without using a primer and to obtain a fixing roller excellent in durability and capable of forming a high grade image free from image defects by using addition type silicone rubber contg. an adhesiveness imparting agent as a material for an elastic layer coated to the periphery of the core bar.
SOLUTION: The periphery of a metallic core bar 2 is coated with an elastic layer 3 made of addition type silicone rubber to obtain an objective fixing roller 1. The thickness of the elastic layer 3 is usually 0.5-8 mm, and 0.5-3 mm thickness is particularly effective. The hardness of the silicone rubber stipulated by JIS K6301 is decided in accordance with the purpose for which the fixing roll is used. In the case of a heating roller e.g. the handness is 1-50° , preferably 10-40° . The silicone rubber is obtd. by curing a compsn, further contg. an adhesiveness imparting agent in a base addition type silicone rubber compsn. consisting of vinyl group-contg. polyorganosiloxane, hydrogen polysiloxane and a curing catalyst.



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CLAIMS

[Claim(s)]
[Claim 1] It is the fixing roller characterized by being addition mold silicone rubber with which said elastic body layer contains an adhesive grant agent in the fixing roller which consists of a fluororesin sleeve with a thickness of 0.15mm or less covered by the periphery of the elastic body layer covered by the periphery of rodding, and this elastic body layer.
[Claim 2] The fixing roller according to claim 1 characterized by said adhesion grant agent being an organic silicon compound containing an epoxy group.
[Claim 3] The fixing roller according to claim 1 or 2 with which the content of said adhesive grant agent is characterized by being below 1 weight section to the addition mold silicone rubber 100 weight section.

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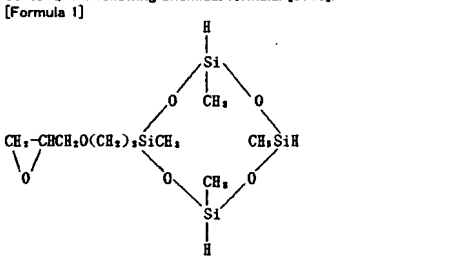
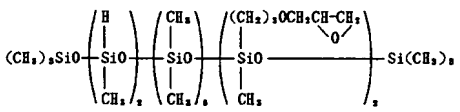
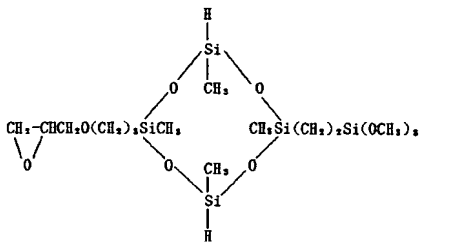
DETAILED DESCRIPTION

[Detailed Description of the Invention]
[0001]
[Field of the Invention] This invention relates to fixing rollers in the fixing section of an electronic copying machine or a laser beam printer (henceforth LBP), such as a heating roller and a pressurization roller.
[0002]
[Description of the Prior Art] Conventionally, in order to improve the mold-release characteristic of a toner in an electronic copying machine or the fixing roller in the fixing section of LBP, the roller which covered the fluororesin sleeve on the periphery of the rubber roller containing rodding is known. As this kind of roller is shown in JP,50-7097,B or JP,51-27276,B It loads with a fluororesin sleeve with an outer diameter smaller than a cylinder metal mold bore inside the inner skin of this cylinder metal mold. While making it stick to the inner skin of cylinder metal mold, fixing the both ends of this fluorine sleeve to the side mold holding rodding, carrying out impregnation restoration of the rubber ingredient with high pressure into the annular space between rodding and a sleeve in this condition, and making a sleeve extend with that filling pressure It is manufactured by the approach of making a sleeve unite with a rubber ingredient.
[0003]
[Problem(s) to be Solved by the Invention] Since exfoliation occurred between metal rodding and an elastic body layer in the early stages of **** when the thickness of an elastic body layer becomes the thin meat of 2mm or less, for example, 0.5-1.0mm, especially the fixing roller manufactured by such approach had the fault that the life as a roller was short. JP,59-5219,B can be firmly pasted to base materials, such as a metal and plastics, without indicating the self-adhesive property constituent which added adhesive grant agents, such as an organic silicon compound which contained the epoxy group in addition mold silicone rubber, and this using a primer. However, although adhesion with metal rodding was good when such a constituent was applied to the manufacture approaches, such as above-mentioned JP,50-7097,B, the side mold holding rodding was also pasted and the present condition was that it is unutilizable. The technical problem of this invention is to offer the fixing roller which can form a high-definition image without a poor image while it improves adhesion with rodding and an elastic body layer, consequently is excellent in endurance, even if it does not necessarily use a primer.
[0004]
[Means for Solving the Problem] this invention persons came to complete a header and this invention for said technical problem being solvable with the following specific fixing rollers, as a result of studying the above-mentioned technical problem wholeheartedly. That is, in the fixing roller with which this invention consists of a fluororesin sleeve with a thickness of 0.15mm or less covered by the periphery of the elastic body layer covered by the periphery of rodding, and this elastic body layer, the fixing roller characterized by said elastic body layer being addition mold silicone rubber containing an adhesive grant agent is offered.
[0005]
[Embodiment of the Invention] Hereafter, the gestalt of operation of this invention is explained using drawing 1 . Drawing 1 shows the gestalt of 1 operation of this invention, and is applied to the heating roller used for the fixing section of a copying machine etc. The elastic body layer 3 to which the heating roller 1 of drawing 1 becomes the periphery of the metal rodding 2 from addition mold silicone rubber is covered. The thickness of the elastic body layer 3 is 0.5-8mm, and is usually especially effective in 0.5-3mm. JIS of addition mold silicone rubber K The degree of hardness (the following and JIS A it is called a degree of hardness) according to 6301 is decided according to the purpose of using a fixing roller, for example, in the case of a heating roller, is usually 10 - 40 degrees preferably 1 to 50 degrees. This addition mold silicone rubber is obtained by stiffening the constituent which contains an adhesive grant agent in the addition mold silicone rubber constituent of the base which consists of the polyorganosiloxane, hydrogen polysiloxane, and curing catalyst of vinyl group content further. The addition mold silicone rubber constituent of the base used for the elastic body layer of a fixing roller

is well-known in this industry, and can also use a commercial thing for this invention. For example, Toray Industries DY35-562 A/B (trade name by Dow Corning Toray Silicone, Inc.), KE1371 A/B (trade name by Shin-Etsu Chemical Co., Ltd.), etc. are mentioned. The organic silicon compound of epoxy group content for example, can be used for said adhesive grant agent. As an example of the organic silicon compound of epoxy group content, it is following chemical formula: [0006].
[Formula 1]







[0007]
[Formula 2]

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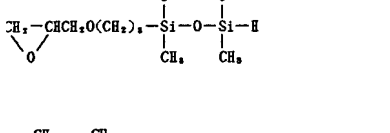

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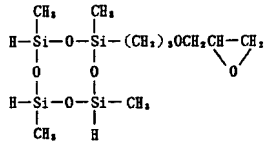
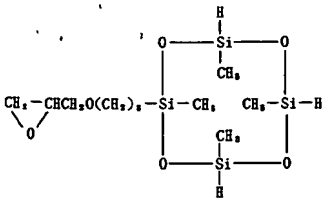


It is alike and the compound shown is illustrated.
[0008] The content of said adhesive grant agent is usually good in below 1 weight section to the addition mold silicone rubber 100 weight section of the above mentioned base, and is the 0.25 - 0.75 weight section preferably. If there are few contents of an adhesive grant agent than the 0.05 weight section, it is ineffective, and if 1 weight section is exceeded conversely, the hardened material of a constituent may fix to metal mold.
[0009] In the addition mold silicone rubber of the elastic body layer 3, various additives, such as a reinforcement nature bulking agent, an increase-in-quantity bulking agent, a coloring agent, conductive matter, a heat-resistant agent, and a pigment, can be added according to the purpose of using a fixing roller, a design objective, etc. In addition, these additives are added in the phase of preparing said addition mold silicone rubber constituent.
[0010] For example, as a reinforcement nature bulking agent, carbon black and a wet silica, and a dry type silica (haze-like silica) are common. A wet silica here is a reinforcement nature silica which consists of a silicon dioxide (SiO2). As the manufacture approach, there are various approaches, such as a direct method which disassembles silicic-acid sodium with a direct sulfuric acid, and an indirect method which silicic-acid sodium is made to react with salts, is made to generate a silicic-acid salt, and then is decomposed with a sulfuric acid or carbon dioxide gas. As a typical wet silica, Nipsil VN3 (trade name by Japan silica industrial incorporated company), Carplex CS-5 (trade name by Shionogi Pharmaceuticals incorporated company), the star sill S (trade name by Konoshima Chemical, Inc.) TOKUSHIRU US (trade name by Tokuyama, Inc.), siluton R-2 (trade name by Mizusawa chemical-industry incorporated company), Hisil223 (trade name made from PPG (U.S.)), and Ultrasil VN3 (trade name made from DEGUZZA (Germany)), Vulkasil S (Bayer (Germany) trade name) etc. is illustrated, and 30 micrometers or less of grade 5 micrometers or less are preferably used for mean particle diameter. A dry type silica is a reinforcement nature silica which carries out heating reduction of the thermal decomposition method and quartz sand of a halogenation silicon, and consists of a silicon dioxide manufactured by the air-oxidation method of evaporated SiO, the thermal decomposition method of an organic silicon compound, etc., and is Aerosil 200, Aerosil R972 (trade name made from Japanese Aerosil, Inc.), and Cab-O-Sil. MS-5 (trade name by Cabot Corp. (U.S.)) and Reolosil QS102 (trade name by Tokuyama, Inc.) are illustrated. In this invention, a wet silica and a dry type silica may be used together if needed.
[0011] Furthermore, lubricant (UETTA) may be added for the purpose of prevention of the secondary bond by the activity on said front face of a silica, and silicone resin, alkoxysilane and siloxanes, a hydroxy silane and siloxanes, silazanes, organic-acid ester, and polyhydric alcohol are illustrated as lubricant.
[0012] An increase-in-quantity bulking agent Moreover, the mechanical characteristic of rubber, i.e., physical reinforcement, a rubber degree of hardness, It is a component required in order to hold the property which should not be lacked on a function as elastic body layers 3, such as a compression set. A calcium carbonate, quartz powder, a silicious marl, a silicic-acid zirconium, clay (silicic-acid aluminum), Talc (water silicic-acid magnesium), wollastonite (meta-silicic-acid calcium), Titanium oxide, a zinc oxide, magnesium oxide, an alumina (aluminum oxide), chromic oxide, red ocher (ferrous oxide), an aluminum sulfate, a barium sulfate, a lithopone, molybdenum disulfide, a mica (mica powder), graphite, etc. are illustrated.

[0013] Especially the combination formula of the bulking agent to the inside of the elastic body layer 3 is not restricted. A reinforcement nature bulking agent and an increase-in-quantity bulking agent are usually 10 - 300 weight section extent to the addition mold silicone rubber 100 weight section of the above mentioned base.
[0014] Moreover, in order to make conductivity give the elastic body layer 3, various kinds of electro-conductivity applying agents are used, and it is good as for 1013 or less ohm-cm in volume resistivity. As these electro-conductivity applying agents, although metal powders, such as acetylene black, conductive carbon black like KETCHIEN black, graphite, silver, copper, and nickel, a conductive zinc white, a conductive calcium carbonate, carbon fiber, etc. are illustrated, carbon black is common. Moreover, a heat-resistant agent like cerium oxide may be added to addition mold silicone rubber.
[0015] As for the fixing roller which consists of silicone rubber, it is common to color it a red ocher color, and fo it to be supplied in many cases, and to usually use red ocher as a coloring agent in this case. When the red ocher for rubber specified to SRIS1108 (Society of Rubber Industry, Japan standard) can be applied as a class of red ocher and the stacking tendency in the rubber at the time of processing needs to be cared about, mean particle diameter like BAIFEROKKUSU 130M (Bayer (Germany) trade name) should just make spherical grade 0.: micrometers or less add about 0.2 to 2% of the weight to silicone rubber.
[0016] A primer may be used although it is not necessary to necessarily use a primer for adhesion with rodding and the elastic body layer 3. For example, still firmer adhesion can be obtained by using the primer of a system for addition mold SHIRIKOGOMU like primer No.101 A/B (trade name by Shin-Etsu Chemical Co., Ltd.). After th metal rodding 2 activates a front face with sandblasting etc. beforehand at this time and degreasing with a methylene chloride etc., a primer is applied, and it is used at 130 degrees C if needed, calcinating about 30 minutes.
[0017] The fluororesin sleeve 4 which consists of PFA (tetrafluoroethylene-perfluoro isopropyl vinyl ether copolymer), an MFA (tetrafluoroethylene-perfluoromethylvinylether copolymer), etc. is covered by the periphery of the elastic body layer 3. The fluororesin sleeve 4 adds electro-conductivity applying agents, such as conductive carbon black, if needed, and its volume resistivity is good also as a conductive fluororesin of 1013 or less ohm-cm. The thickness of the fluororesin sleeve 4 is 0.15mm or less, and is 0.02-0.07mm preferably.
[0018] Although it is not necessary to necessarily use a primer for adhesion with the fluororesin sleeve 4 and the elastic body layer 3, it can also be made to paste up more firmly with the elastic body layer 3 by using a primer. In that case, a silicone system primer like KEMUROKKU 607 (Load Far East, Incorporated trade name) is usually applied to the inside of the fluororesin sleeve 4 which performed inside processing, and it vulcanizes with the elastic body layer 3 which consists of silicone rubber. as the inside art of a fluororesin sleeve — tetra— the approach of carrying out a chemical treatment with the solution made to dissolve metallic sodium and naphthalene in THF (tetrahydrofuran) or the ethylene-glycol wood ether like H (trade name by Junkosha, Inc.), the approach of making dissolve metallic sodium in liquid ammonia, and carrying out a chemical treatment with a solution, the approach of carrying out a chemical treatment by the mercury amalgam of alkali metal like a lithium an electrolytic-reduction method, a corona-discharge approach, the approach of processing with inert-gas plasma like helium or an argon the approach of processing by excimer laser, etc. be illustrated
[0019] In order to manufacture the fixing roller of this invention, first, rodding 2 is prepared and metal mold is equipped. As for the metal mold used, it is important to give hard chrome plating etc. beforehand and to make a front face inactive, and use is presented with it with the release agent like mold spot MR-K681 (trade name by Asahi Glass Co., Ltd.). Metal mold is loaded with the fluororesin sleeve 4 after equipping with rodding 2, subsequently, between rodding 2 and the fluororesin sleeve 4, pour in the addition mold silicone rubber constituent which blended other additives an adhesive grant agent and if needed, it is made to harden with heating, and the elastic body layer 3 is formed. Temperature and time amount required for hardening are decide by the class of addition mold silicone rubber constituent to be used. The obtained fixing roller is removed from metal mold after hardening.
[0020]
[Example] Hereafter, this invention is more concretely explained using an example. In addition, this invention is not limited to an example and can be changed if needed.
(Example 1) In drawing 1 , an outer diameter the rodding 2 whose die length is 220mm by 30mm Make a metal mold internal surface inactive by hard chrome plating beforehand, and the metal mold (not shown) which applied mold spot MR-K681 (trade name by Asahi Glass Co., Ltd.) of a release agent further is equipped. Subsequently, it is formula: [0021] to the Toray Industries DY35-562 A/B(addition mold silicone rubber constituent by Dow Corning Toray Silicone, Inc.) 100 weight section between the rodding 2 after loading with the PFA fluororesin sleeve 4 of thickness [of 50 micrometers] m, and the PFA fluororesin sleeve 4.
[Formula 3]



The addition mold silicone rubber constituent which came out and blended the epoxy group content organic silicon compound shown at a rate of 1 weight section was poured in. It is made to harden in 120 degree-Cx 1 hour after impregnation, and is JIS A at the thickness of 0.5mm to the periphery of rodding 2. The degree of hardness formed the elastic body layer 3 made with the silicone rubber which is 30 degrees. In this way, the **** trial by the copying machine of the obtained fixing roller was performed. NP6030 (trade name) by Canon, Inc. was used for the copying machine. Evaluation of a **** trial was performed by in how many sheets an A4 size PPC form is continuously ****(ed) in a blank paper, and adhesion peeling occurs. The result of a **** trial is shown in Table 1.

[0022] (Examples 2-7) In the example 1, the same actuation as an example 1 performed production and its evaluation of a fixing roller except having changed into the amount which shows the loadings of an adhesive grant agent (epoxy group content silicon compound) in Table 1. In addition, in the example 7, since the silicone rubber constituent adhered also to the side mold, it turned out that workability is inferior. The result of a **** trial is shown in Table 1.

(Example 1 of a comparison) In the example 1, the same actuation as an example 1 performed production and its evaluation of a fixing roller except having not used an adhesive grant agent. The result of a **** trial is shown in Table 1.

[0023]

[Table 1]

	弾性体用の組成（重量部）		通紙試験結果		
	東レDY35-562A/B	接着性付与剤	紙シワの発生	画質	通紙枚数
実施例1	100	1	無	良	>100000
実施例2	100	0.7	無	良	>100000
実施例3	100	0.5	無	良	>100000
実施例4	100	0.3	無	良	>100000
実施例5	100	0.1	無	良	>100000
実施例6	100	0.05	無	良	>100000
実施例7	100	2	無	良	>100000
比較例1	100	0	無	良	10000[1]

1) When **** number of sheets exceeded 10000 sheets, the elastic body layer exfoliated.

[0024] As for the result of Table 1, in the heating roller with which the content of the organic silicon compound of epoxy group content used the addition mold silicone rubber below 2 weight sections, after the **** trial of 100,000 sheets shows that adhesion peeling does not occur to the addition mold silicone rubber 100 weight section. On the other hand, in the addition mold silicone rubber which does not add the organic silicon compound of epoxy group content, it turns out that exfoliation occurred between rodding - silicone rubber elastic body layers at the time of 10,000 sheets.

[0025]

[Effect of the Invention] Since the fixing roller of this invention does not have rodding, an elastic body layer,

exfoliation of a between, and exfoliation between an elastic body layer and a fluororesin sleeve, it excels in endurance over a long period of time. Moreover, the quality of the image obtained is also good.

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TECHNICAL FIELD

[Field of the Invention] This invention relates to fixing rollers in the fixing section of an electronic copying machine or a laser beam printer (henceforth LBP), such as a heating roller and a pressurization roller.

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PRIOR ART

[Description of the Prior Art] Conventionally, in order to improve the mold-release characteristic of a toner in a electronic copying machine or the fixing roller in the fixing section of LBP, the roller which covered the fluororesin sleeve on the periphery of the rubber roller containing rodding is known. As this kind of roller is shown in JP,50-7097,B or JP,51-27276,B It loads with a fluororesin sleeve with an outer diameter smaller than cylinder metal mold bore inside the inner skin of this cylinder metal mold. While making it stick to the inner skin of cylinder metal mold, fixing the both ends of this fluorine sleeve to the side mold holding rodding, carrying out impregnation restoration of the rubber ingredient with high pressure into the annular space between rodding and a sleeve in this condition, and making a sleeve extend with that filling pressure It is manufactured by the approach of making a sleeve unite with a rubber ingredient.

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EFFECT OF THE INVENTION

[Effect of the Invention] Since the fixing roller of this invention does not have rodding, an elastic body layer, exfoliation of a between, and exfoliation between an elastic body layer and a fluororesin sleeve, it excels in endurance over a long period of time. Moreover, the quality of the image obtained is also good.

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TECHNICAL PROBLEM

[Problem(s) to be Solved by the Invention] Since exfoliation occurred between metal rodding and an elastic body layer in the early stages of **** when the thickness of an elastic body layer becomes the thin meat of 2mm or less, for example, 0.5-1.0mm, especially the fixing roller manufactured by such approach had the fault that the life as a roller was short. JP,59-5219,B can be firmly pasted to base materials, such as a metal and plastics, without indicating the self-adhesive property constituent which added adhesive grant agents, such as an organic silicon compound which contained the epoxy group in addition mold silicone rubber, and this using a primer. However, although adhesion with metal rodding was good when such a constituent was applied to the manufacture approaches, such as above-mentioned JP,50-7097,B, the side mold holding rodding was also paste and the present condition was that it is unutilizable. The technical problem of this invention is to offer the fixing roller which can form a high-definition image without a poor image while it improves adhesion with rodding and a elastic body layer, consequently is excellent in endurance, even if it does not necessarily use a primer.

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MEANS

[Means for Solving the Problem] this invention persons came to complete a header and this invention for said technical problem being solvable with the following specific fixing rollers, as a result of studying the above-mentioned technical problem wholeheartedly. That is, in the fixing roller with which this invention consists of a fluororesin sleeve with a thickness of 0.15mm or less covered by the periphery of the elastic body layer covered by the periphery of rodding, and this elastic body layer, the fixing roller characterized by said elastic body layer being addition mold silicone rubber containing an adhesive grant agent is offered.
[0005]
[Embodiment of the Invention] Hereafter, the gestalt of operation of this invention is explained using drawing 1. Drawing 1 shows the gestalt of 1 operation of this invention, and is applied to the heating roller used for the fixing section of a copying machine etc. The elastic body layer 3 to which the heating roller 1 of drawing 1 becomes the periphery of the metal rodding 2 from addition mold silicone rubber is covered. The thickness of the elastic body layer 3 is 0.5-8mm, and is usually especially effective in 0.5-3mm. JIS of addition mold silicone rubber K The degree of hardness (the following and JIS A it is called a degree of hardness) according to 6301 is decided according to the purpose of using a fixing roller, for example, in the case of a heating roller, is usually 10 - 40 degrees preferably 1 to 50 degrees. This addition mold silicone rubber is obtained by stiffening the constituent which contains an adhesive grant agent in the addition mold silicone rubber constituent of the base which consists of the polyorganosiloxane, hydrogen polysiloxane, and curing catalyst of vinyl group content further. The addition mold silicone rubber constituent of the base used for the elastic body layer of a fixing roller is well-known in this industry, and can also use a commercial thing for this invention. For example, Toray Industries DY35-562 A/B (trade name by Dow Corning Toray Silicone, Inc.), KE1371 A/B (trade name by Shin-Etsu Chemical Co., Ltd.), etc. are mentioned. The organic silicon compound of epoxy group content for example, can be used for said adhesive grant agent. As an example of the organic silicon compound of epoxy group content, it is following chemical formula: [0006].
[Formula 1]

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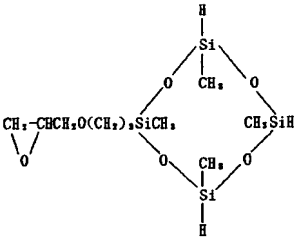

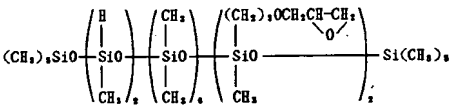

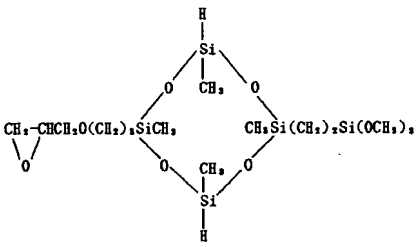

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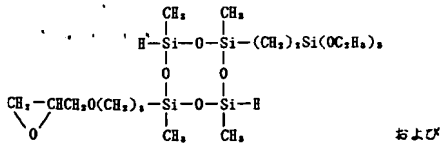
[Formula 2]



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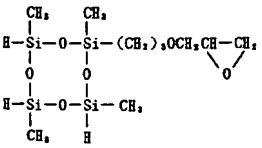

It is alike and the compound shown is illustrated.
[0008] The content of said adhesive grant agent is usually good in below 1 weight section to the addition mold silicone rubber 100 weight section of the above mentioned base, and is the 0.25 - 0.75 weight section preferably. If there are few contents of an adhesive grant agent than the 0.05 weight section, it is ineffective, and if 1 weight section is exceeded conversely, the hardened material of a constituent may fix to metal mold.
[0009] In the addition mold silicone rubber of the elastic body layer 3, various additives, such as a reinforcement nature bulking agent, an increase-in-quantity bulking agent, a coloring agent, conductive matter, a heat-resistant agent, and a pigment, can be added according to the purpose of using a fixing roller, a design objective, etc. In addition, these additives are added in the phase of preparing said addition mold silicone rubber constituent.
[0010] For example, as a reinforcement nature bulking agent, carbon black and a wet silica, and a dry type silica (haze-like silica) are common. A wet silica here is a reinforcement nature silica which consists of a silicon dioxide (SiO2). As the manufacture approach, there are various approaches, such as a direct method which disassembles silicic-acid sodium with a direct sulfuric acid, and an indirect method which silicic-acid sodium is made to react with salts, is made to generate a silicic-acid salt, and then is decomposed with a sulfuric acid or carbon dioxide gas. As a typical wet silica, Nipsil VN3 (trade name by Japan silica industrial incorporated company), Carplex CS-5 (trade name by Shionogi Pharmaceuticals incorporated company), the star sill S (trade name by Konoshima Chemical, Inc.) TOKUSHIRU US (trade name by Tokuyama, Inc.), siluton R-2 (trade name by Mizusawa chemical-industry incorporated company), Hisil223 (trade name made from PPG (U.S.)), and Ultrasil VN3 (trade name made from DEGUZZA (Germany)), Vulkasil S (Bayer (Germany) trade name) etc. is illustrated, and 30 micrometers or less of grade 5 micrometers or less are preferably used for mean particle diameter. A dry type silica is a reinforcement nature silica which carries out heating reduction of the thermal decomposition method and quartz sand of a halogenation silicon, and consists of a silicon dioxide manufactured by the air-oxidation method of evaporated SiO, the thermal decomposition method of an organic silicon compound, etc., and is Aerosil 200, Aerosil R972 (trade name made from Japanese Aerosil, Inc.), and Cab-O-Sil, MS-5 (trade name by Cabot Corp. (U.S.)) and Reolosil QS102 (trade name by Tokuyama, Inc.) are illustrated. In this invention, a wet silica and a dry type silica may be used together if needed.
[0011] Furthermore, lubricant (UETTA) may be added for the purpose of prevention of the secondary bond by the activity on said front face of a silica, and silicone resin, alkoxysilane and siloxanes, a hydroxy silane and siloxanes, silazanes, organic-acid ester, and polyhydric alcohol are illustrated as lubricant.
[0012] An increase-in-quantity bulking agent Moreover, the mechanical characteristic of rubber, i.e., physical reinforcement, a rubber degree of hardness, It is a component required in order to hold the property which should not be lacked on a function as elastic body layers 3, such as a compression set. A calcium carbonate, quartz powder, a silicious marl, a silicic-acid zirconium, clay (silicic-acid aluminum), Talc (water silicic-acid magnesium), wollastonite (meta-silicic-acid calcium), Titanium oxide, a zinc oxide, magnesium oxide, an alumina (aluminum oxide), chromic oxide, red ocher (ferrous oxide), an aluminum sulfate, a barium sulfate, a lithopone, molybdenum disulfide, a mica (mica powder), graphite, etc. are illustrated.

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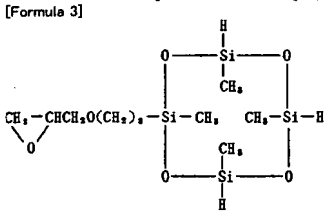
EXAMPLE

[Example] Hereafter, this invention is more concretely explained using an example. In addition, this invention is not limited to an example and can be changed if needed.
(Example 1) In drawing 1 , an outer diameter the rodding 2 whose die length is 220mm by 30mm Make a metal mold internal surface inactive by hard chrome plating beforehand, and the metal mold (not shown) which applied mold spot MR-K681 (trade name by Asahi Glass Co., Ltd.) of a release agent further is equipped. Subsequently, it is formula: [0021] to the Toray Industries DY35-562 A/B(addition mold silicone rubber constituent by Dow Corning Toray Silicone, Inc.) 100 weight section between the rodding 2 after loading with the PFA fluororesin sleeve 4 of thickness [of 50 micrometers] m, and the PFA fluororesin sleeve 4.
[Formula 3]



The addition mold silicone rubber constituent which came out and blended the epoxy group content organic silicon compound shown at a rate of 1 weight section was poured in. It is made to harden in 120 degree-Cx 1 hour after impregnation, and is JIS A at the thickness of 0.5mm to the periphery of rodding 2. The degree of hardness formed the elastic body layer 3 made with the silicone rubber which is 30 degrees. In this way, the **** trial by the copying machine of the obtained fixing roller was performed. NP6030 (trade name) by Canon, Inc. was used for the copying machine. Evaluation of a **** trial was performed by in how many sheets an A4 size PPC form is continuously ****(ed) in a blank paper, and adhesion peeling occurs. The result of a **** trial is shown in Table 1.
[0022] (Examples 2-7) In the example 1, the same actuation as an example 1 performed production and its evaluation of a fixing roller except having changed into the amount which shows the loadings of an adhesive grant agent (epoxy group content silicon compound) in Table 1. In addition, in the example 7, since the silicone rubber constituent adhered also to the side mold, it turned out that workability is inferior. The result of a **** trial is shown in Table 1.
(Example 1 of a comparison) In the example 1, the same actuation as an example 1 performed production and its evaluation of a fixing roller except having not used an adhesive grant agent. The result of a **** trial is shown in Table 1.
[0023]
[Table 1]

[0013] Especially the combination formula of the bulking agent to the inside of the elastic body layer 3 is not restricted. A reinforcement nature bulking agent and an increase-in-quantity bulking agent are usually 10 - 300 weight section extent to the addition mold silicone rubber 100 weight section of the above mentioned base.
[0014] Moreover, in order to make conductivity give the elastic body layer 3, various kinds of electro-conductivity applying agents are used, and it is good as for 1013 or less ohm-cm in volume resistivity. As these electro-conductivity applying agents, although metal powders, such as acetylene black, conductive carbon black like KETCHIEN black, graphite, silver, copper, and nickel, a conductive zinc white, a conductive calcium carbonate, carbon fiber, etc. are illustrated, carbon black is common. Moreover, a heat-resistant agent like cerium oxide may be added to addition mold silicone rubber.
[0015] As for the fixing roller which consists of silicone rubber, it is common to color it a red ocher color, and fc it to be supplied in many cases, and to usually use red ocher as a coloring agent in this case. When the red ocher for rubber specified to SRIS1108 (Society of Rubber Industry, Japan standard) can be applied as a class of red ocher and the stacking tendency in the rubber at the time of processing needs to be cared about, mean particle diameter like BAIFEROKKUSU 130M (Bayer (Germany) trade name) should just make spherical grade 0.: micrometers or less add about 0.2 to 2% of the weight to silicone rubber.
[0016] A primer may be used although it is not necessary to necessarily use a primer for adhesion with rodding and the elastic body layer 3. For example, still firmer adhesion can be obtained by using the primer of a system for addition mold SHIRIKOGOMU like primer No.101 A/B (trade name by Shin-Etsu Chemical Co., Ltd.). After th metal rodding 2 activates a front face with sandblasting etc. beforehand at this time and degreasing with a methylene chloride etc., a primer is applied, and it is used at 130 degrees C if needed, calcinating about 30 minutes.
[0017] The fluororesin sleeve 4 which consists of PFA (tetrafluoroethylene-perfluoro isopropyl vinyl ether copolymer), an MFA (tetrafluoroethylene-perfluoromethylvinylether copolymer), etc. is covered by the periphery of the elastic body layer 3. The fluororesin sleeve 4 adds electro-conductivity applying agents, such as conductive carbon black, if needed, and its volume resistivity is good also as a conductive fluororesin of 1013 or less ohm-cm. The thickness of the fluororesin sleeve 4 is 0.15mm or less, and is 0.02-0.07mm preferably.
[0018] Although it is not necessary to necessarily use a primer for adhesion with the fluororesin sleeve 4 and the elastic body layer 3, it can also be made to paste up more firmly with the elastic body layer 3 by using a primer. In that case, a silicone system primer like KEMUROKKU 607 (Load Far East, Incorporated trade name) is usually applied to the inside of the fluororesin sleeve 4 which performed inside processing, and it vulcanizes with the elastic body layer 3 which consists of silicone rubber. as the inside art of a fluororesin sleeve -- tetra---- the approach of carrying out a chemical treatment with the solution made to dissolve metallic sodium and naphthalene in THF (tetrahydrofuran) or the ethylene-glycol wood ether like H (trade name by Junkosha, Inc.), the approach of making dissolve metallic sodium in liquid ammonia, and carrying out a chemical treatment with a solution, the approach of carrying out a chemical treatment by the mercury amalgam of alkali metal like a lithium an electrolytic-reduction method, a corona-discharge approach, the approach of processing with inert-gas plasma like helium or an argon the approach of processing by excimer laser, etc. be illustrated
[0019] In order to manufacture the fixing roller of this invention, first, rodding 2 is prepared and metal mold is equipped. As for the metal mold used, it is important to give hard chrome plating etc. beforehand and to make a front face inactive, and use is presented with it with the release agent like mold spot MR-K681 (trade name by Asahi Glass Co., Ltd.). Metal mold is loaded with the fluororesin sleeve 4 after equipping with rodding 2, subsequently, between rodding 2 and the fluororesin sleeve 4, pour in the addition mold silicone rubber constituent which blended other additives an adhesive grant agent and if needed, it is made to harden with heating, and the elastic body layer 3 is formed. Temperature and time amount required for hardening are decide by the class of addition mold silicone rubber constituent to be used. The obtained fixing roller is removed from metal mold after hardening.

[Translation done.]

	弾性体層の組成（重量部）		通紙試験結果		
	東レDY35-562A/B	接着性付与剤	紙シワの発生	画質	通紙枚数
実施例1	100	1	無	良	>100000
実施例2	100	0.7	無	良	>100000
実施例3	100	0.5	無	良	>100000
実施例4	100	0.3	無	良	>100000
実施例5	100	0.1	無	良	>100000
実施例6	100	0.05	無	良	>100000
実施例7	100	2	無	良	>100000
比較例1	100	0	無	良	10000[1]

1) When **** number of sheets exceeded 10000 sheets, the elastic body layer exfoliated.
[0024] As for the result of Table 1, in the heating roller with which the content of the organic silicon compound of epoxy group content used the addition mold silicone rubber below 2 weight sections, after the **** trial of 100,000 sheets shows that adhesion peeling does not occur to the addition mold silicone rubber 100 weight section. On the other hand, in the addition mold silicone rubber which does not add the organic silicon compoun of epoxy group content, it turns out that exfoliation occurred between rodding - silicone rubber elastic body layers at the time of 10,000 sheets.

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EFFECT OF THE INVENTION

[Effect of the Invention] Since the fixing roller of this invention does not have rodding, an elastic body layer, exfoliation of a between, and exfoliation between an elastic body layer and a fluororesin sleeve, it excels in endurance over a long period of time. Moreover, the quality of the image obtained is also good.

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DESCRIPTION OF DRAWINGS

[Brief Description of the Drawings]
[Drawing 1] It is the sectional view showing one example of the heating roller of this invention.
[Description of Notations]
1 Roller
2 Rodding
3 Silicone Rubber Elastic Body Layer
4 Fluororesin Sleeve

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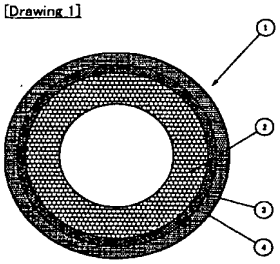
DRAWINGS

[Drawing 1]



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